

Success Rate after 2-Stage Hip Arthroplasty Exchange and Risk Factors for Reinfection: A Prospective Cohort Study of 187 Hips

Stavros Goumenos, Olga Pidgaiska¹, Sebastian Hardt², Vassilios A Kontogeorgakos³, Ulrich Stockle, Andrej Trampuz⁴, Carsten Perka⁵, Sebastian Meller

¹Sytenko Inst of Spine and Joint Pathology, ²Charite-Universitätsmedizin Berlin, ³National and Kapodistrian University of Athens, ⁴Charité - University Medicine, ⁵Charite University Hospital

INTRODUCTION: Two-stage implant exchange remains the treatment of choice for chronic periprosthetic infection (PJI) of a total hip arthroplasty (THA), especially when it involves complex cases with surrounding soft tissue compromise or challenging pathogens. The aims of our study were 1) to determine the success rate of 2-stage implant exchange for the treatment of PJI after THA and 2) to investigate for relevant risk factors for reinfection and subsequent revision surgeries after reimplantation.

METHODS: After institutional board approval we conducted a prospective analysis of 187 patients who underwent a 2-stage revision THA after being diagnosed with THA PJI from 2013 to 2019 according to our standardized treatment protocol. The mean duration of follow up was 54.2 ± 24.9 months (>36 months) and the mean duration of 1st to 2nd stage interval was 9.8 ± 8.9 weeks (>2 weeks). All patients remained in a Girdlestone situation between the two stages. Patients who were infection-free after their 2-stage treatment were considered as treatment success. Reinfection and reoperation rates were estimated through Kaplan-Meier curves and the investigation for potential risk factors was performed using Cox hazard regression.

RESULTS:

The overall success rate in our cohort was 85.6%. The estimated cumulative probability of reinfection was 9% (95% CI = 5.8-14.7%), 11.5% (95% CI = 7.5-17.3%), and 14% (95% CI = 10.2-21.2%) for the first 6, 12, and 24 months after the reimplantation surgery respectively. The estimated cumulative reinfection-free survival was 84% (95% CI = 79.8-89.9%). DDT (difficult-to-treat) or high virulence pathogens were found to be significant independent risk factors for infection recurrence (HR=1.31, 95% CI: 1.47-9.36, $p=0.006$ and HR=1.35, 95% CI: 1.73-8.57, $p=0.001$). Any history of another previous 2-stage implant exchange of the affected hip was also found to be an independent predictor for reinfection after reimplantation (HR=1.28, 95% CI: 1.33-9.62, $p=0.01$).

Among reinfections, persistent PJIs were significantly fewer than new PJIs caused from a different pathogen (26% vs. 74%, $p=0.012$, $x^2=6.26$). Overall reoperation and revision rates were 26.2% and 16.6% respectively during the entire course of the follow up. Reinfected patients had 80% higher probability for reoperation than the non-infected ones ($p<0.001$, Log-rank= 102.6) and they were 55% more likely to undergo revision surgery during their follow up ($p<0.001$, Log-rank=55.4).

DISCUSSION AND CONCLUSION: Reinfection rates after 2-stage THA revision for PJI still remain high, especially in affected patients with prior failed 2-stage implant exchange or challenging infections involving high-grade or difficult-to-treat pathogens. Periprosthetic joint reinfection seems to favor new versus persistent pathogens.